Paragraph beginning on Page 9, line 1, and ending on Page 10, line 3.

There is an increasing need for a system for detecting and treating biological and chemical warfare agents. The threat of an attack with chemical or biological weapons on U.S. citizens is a high priority concern. Events such as the World Trade Center and Oklahoma City bombings, the Tokyo subway nerve gas attack, the Sverdlovisk Soviet Union release of dry anthrax spores, and several bio-terrorism scares have accelerated private and U.S. Government efforts to combat terrorism, particularly chemical and biological terrorism. In the face of the potential for chemical and biological terrorism, the country's national security is increasingly defined by its ability to respond with new technology. Biological warfare is the intentional use of micro-organisms and toxins, generally, of microbial, plant, or animal origin to produce disease and/or death in humans. This can be accomplished directly, through the food supply, through the water supply, or through the air supply. Biological agents are of particular concern because of the ease with which they can be manufactured, transported, and dispensed. Because of the lag time between a biological attack and the appearance of symptoms in those exposed, biological weapons could be devastating. Many biological agents are contagious; and during this lag time, infected persons could continue to spread the disease, further increasing its reach. Hundreds or even thousands of people could become sick or die if a biological attack were to occur in a major metropolitan area. Because the lethality of an airborne pathogen depends upon its concentration, the greatest threat to our citizens would be the release of a quantity of agent into an enclosed airspace of an occupied building.

B1

Paragraph beginning on Page 11, line 6, and ending on Page 11, line 13.

The vast majority of buildings need not resort to such an expensive, maintenance-intensive approach, since most buildings will never be the target of a BW agent attack. Following the basic concept of a smoke detector, the present invention minimizes the maintenance burden to a building. That is, the HVAC system would operate essentially

B2 unchanged once the new system is installed, except that the new system could activate a precipitator/scrubber if a pathogen were detected in the air supply. Absent this detection, the annual maintenance burden would be only slightly increased.

Paragraph beginning on Page 13, line 10, and ending on Page 13, line 19.

The risk posed by chemical agents has two components: a vapor and liquid hazard. Airborne chemical agents can be contacted by humans through inhalation or dermis absorption. An array of chemical point detectors and alarms that can provide real time warnings of exposure are available. In contrast, the hazard posed by airborne biological

B3 agents is primarily an inhalation one. The most effective means of delivering a biological agent is via an aerosol in the one-to-five μm particle size. Creation of this type of an invisible aerosol cloud could be efficiently accomplished using a sprayer, as was demonstrated by the US Official BW program that was unilaterally terminated in the 1960s.

Paragraph beginning on Page 13, line 20, and ending on Page 14, line 10.

Chemical and toxin attacks can have immediate effect. Pathogen detectors for

B4 human respiration need to focus on the following considerations. A calculated respiratory

exchange rate, assuming 15% aerobic efficiency, when burning approximately 100 calories/hour with

$$n\,O_2 + (C(H_2O))_n \rightarrow n\,CO_2 + n\,H_2O$$

is 10 liters of air/minute. Starting with 1 ACPLA of B.a., where one particle can be assumed to consist of 15 spores, then a person, assuming high efficiency for deposition and germination of spores in the lungs, would receive a lethal dose of 8000 to 10,000 spores in roughly 1 hour. The respiratory exchange rate can be considered to be higher, 15 liters of air/minute, when you include the sinus cavity, throat, trachea, larynx, mouth, etc.

B4

Paragraph beginning on Page 16, line 15, and ending on Page 17, line 6.

The APDS, identified generally by the reference numeral 22, includes aerosol collector 23, a system for capture of antibody coated beads 24, a biotin labeled antibody system 25, a fluorescent labeled streptavidin system 26, a flow controller 35, a detector 34, a laser 33, and a flow cytometer32. The objective is to combine the ultrahigh sensitivity and selectivity of PCR-based biodetection of biological agents with the more general assays that can be performed with flow cytometry. Flow cytometry (FCM) is a technique used to characterize and categorize biological cells and/or their contents, such as DNA, to record their distributions, and can also be used to sort biological material. The biological cells are present in an aqueous-based solution, even when the sample material is eluted from a matrix, such as in sheath-flow detection in electrophoresis experiments. The APDS may operate using a hybrid instrument that employs both antibody based assays and PCR assays.

B5

Paragraph beginning on Page 19, line 15, and ending on Page 20, line 7.

The flow cell cytometer 32 can also be a system such as that disclosed and claimed in U. S. Patent Application No. 09/027764, filed February 23, 1998, by Raymond P. Mariella Jr. for Waveguide Detection of Right-Angle-Scattered Light In Flow Cytometry, which is incorporated herein by reference. That system uses a transparent flow cell as an index-guided optical waveguide, similar in some respects to U.S Patent No. 5,475,487. A detector for the flow cell but not the liquid stream would then be used to detect the Right-Angle-Scattered (RAS) Light, (RAS includes both PLS and inellastically-scattered light) , exiting from one end of the flow cell. As before, the detector(s) could view the trapped RAS light from the flow cell either directly or through intermediate optical light guides. If the light exits the end of the flow cell referred to as "bottom," then the top of the flow cell could be given a high-reflectivity coating to approximately double the amount of light collected. This system would be much more robust in its alignment than the traditional flow cytometry systems which use imaging optics, such as microscope objectives.

B6

Paragraph beginning on Page 25, line 4, and ending on Page 25, line 10.

B7

Biological agents are many times deadlier, pound-for pound, than chemical agents. One gram of anthrax spores could kill as many people as a ton of the nerve agent sarin. There are four distinct types of chemical weapons: nerve, blister, blood, and incapacitating agents. The effects from these chemical agents can occur within seconds of exposure as in